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Cheng et al.

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(54) **SYSTEM AND METHOD FOR MAKING A GOLF BALL WITH ONE OR MORE PATTERNED FILM LAYERS**

(75) Inventors: **Chia-Chyi Cheng**, Portland, OR (US);
Bradley C. Tutmark, Aloha, OR (US)

(73) Assignee: **NIKE, Inc.**, Beaverton, OR (US)

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(51) **Int. Cl.**

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A63B 45/00 (2006.01)
B29C 49/46 (2006.01)
B29C 63/22 (2006.01)
B29L 31/54 (2006.01)
B29C 63/48 (2006.01)

(52) **U.S. Cl.**

CPC **A63B 37/0004** (2013.01); **A63B 37/0003** (2013.01); **A63B 37/0022** (2013.01); **A63B 37/0074** (2013.01); **A63B 37/0092** (2013.01); **A63B 45/00** (2013.01); **B29C 49/46** (2013.01); **B29C 63/22** (2013.01); **B29C 2063/485** (2013.01); **B29L 2031/546** (2013.01)

(58) **Field of Classification Search**

CPC **A63B 37/0022**; **A63B 45/02**
USPC **473/378**
See application file for complete search history.

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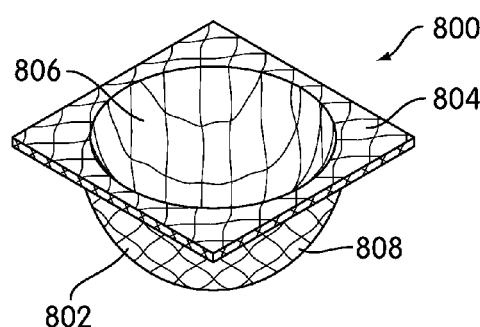
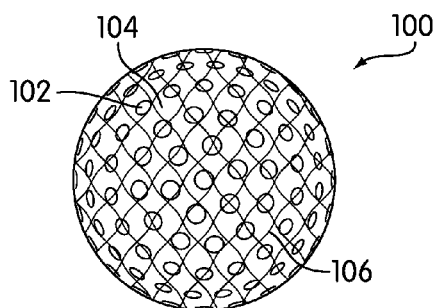
Primary Examiner — Raeann Gorden

(74) *Attorney, Agent, or Firm* — Honigman Miller Schwartz and Cohn LLP

(57) **ABSTRACT**

A system and method for manufacturing a golf ball with one or more patterned film layers is disclosed. The system and method may involve creating a patterned film layer and applying the patterned film layer to the surface of a golf ball. The patterned film layer may include a layer of film having cutouts leaving the remaining portions of film in a pattern. The pattern may include a net pattern. The patterned film layer may include a material that is relatively harder or relatively softer than the surface of the golf ball. The method may include removing portions of film from a film material to create a patterned film material, cutting the patterned film material into sheets, molding two patterned film sheets into substantially hemispherical cups, and applying the two substantially hemispherical cups to a golf ball.

23 Claims, 6 Drawing Sheets



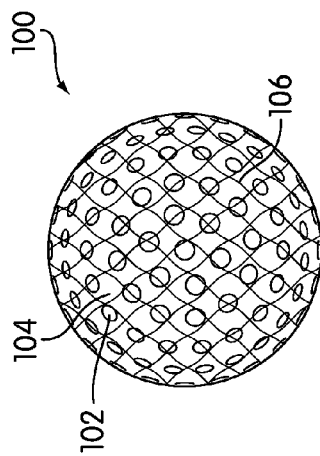


FIG. 1

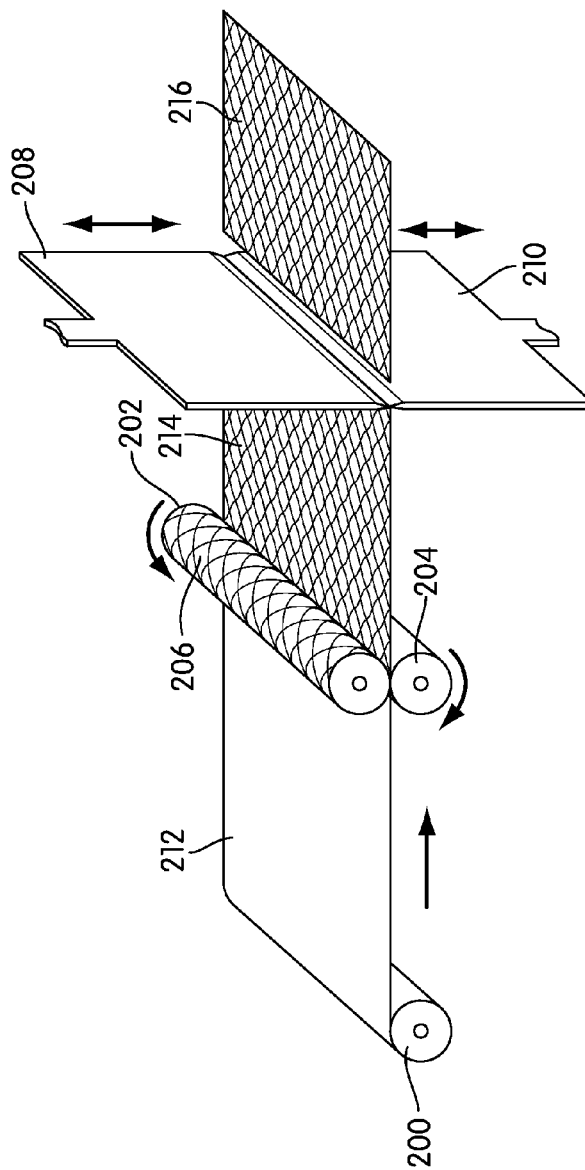


FIG. 2

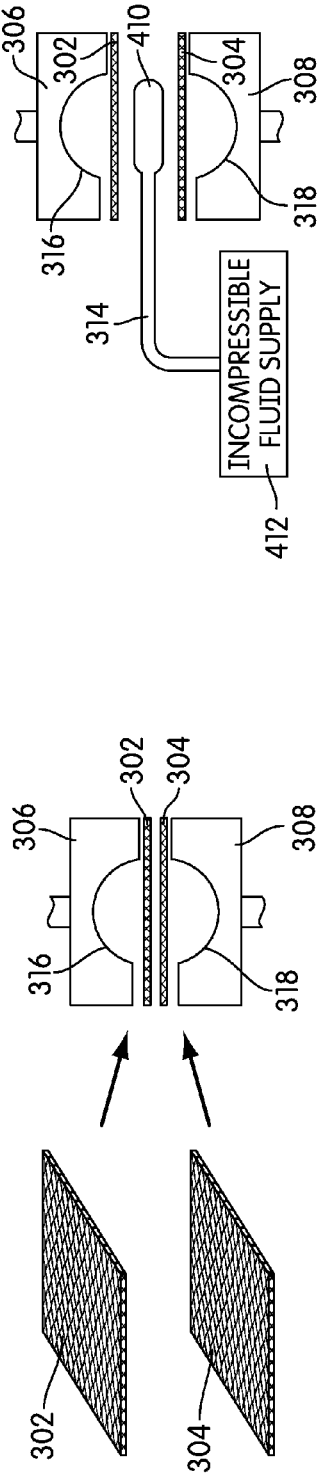


FIG. 3

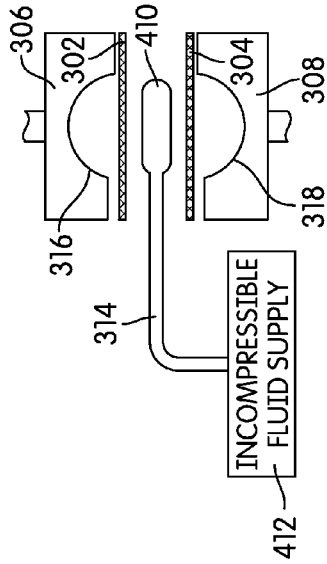


FIG. 4

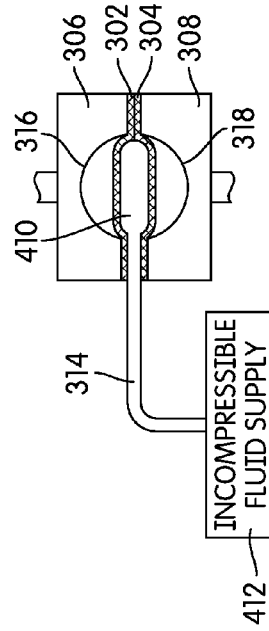


FIG. 5

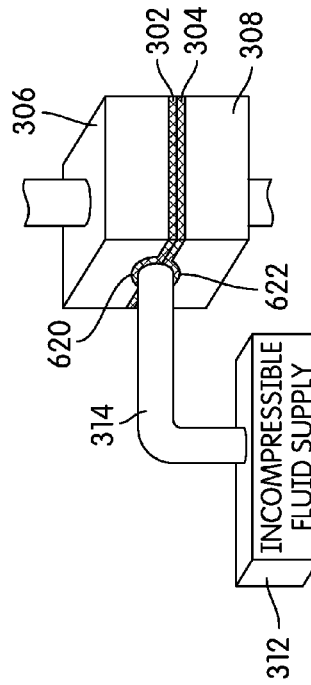


FIG. 6

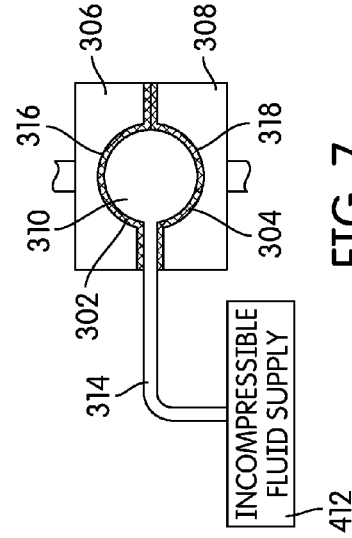


FIG. 7

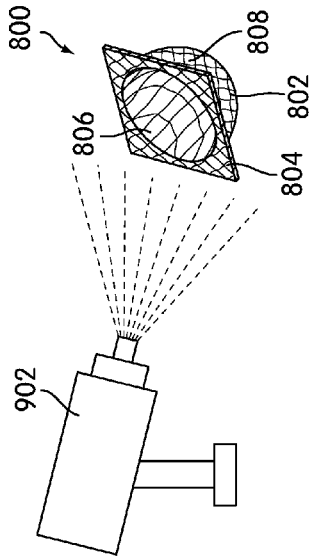


FIG. 9

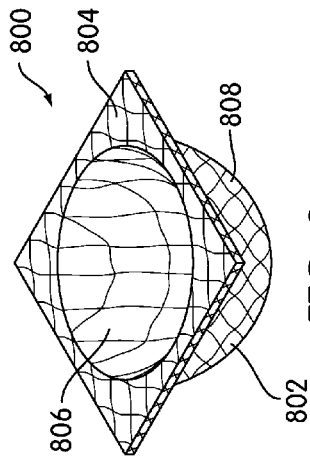


FIG. 8

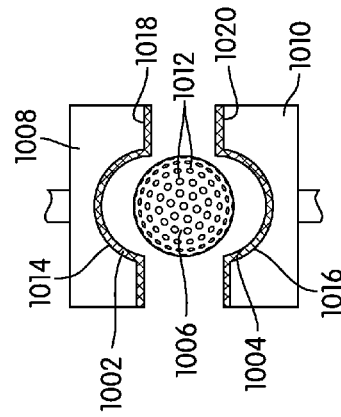


FIG. 10

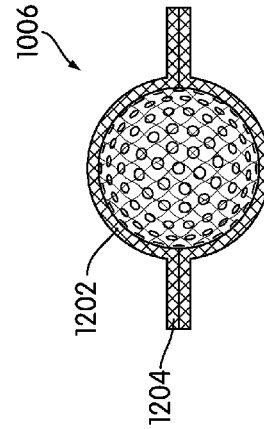


FIG. 12

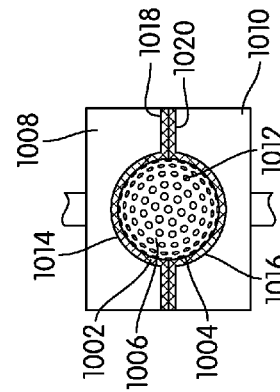


FIG. 11

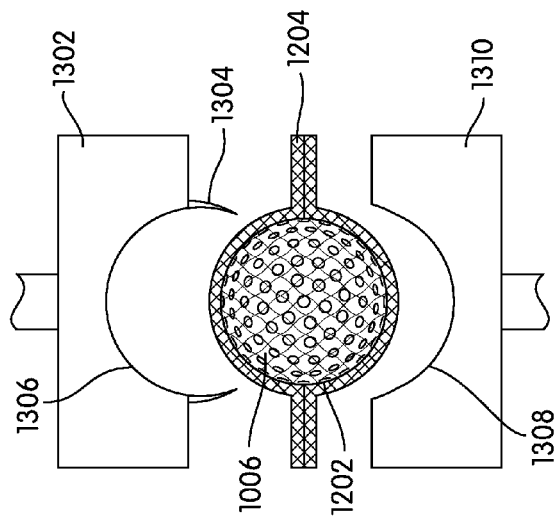


FIG. 13

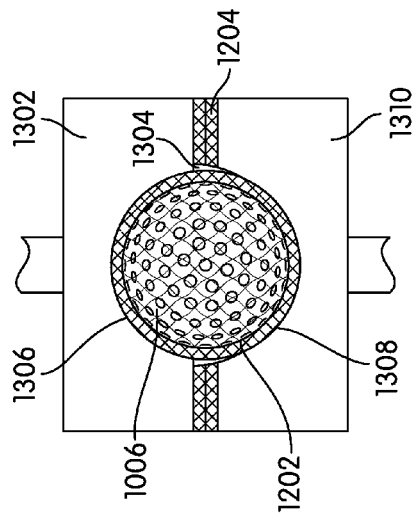


FIG. 14

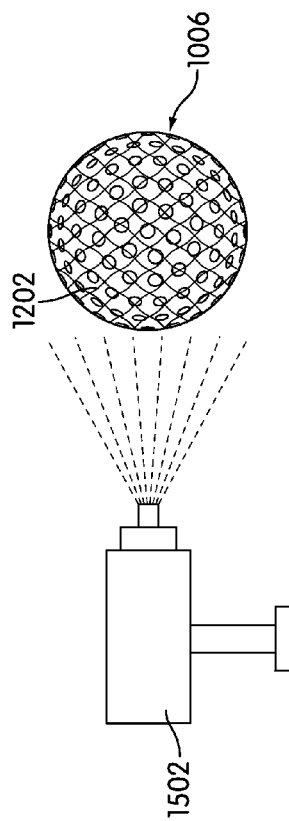


FIG. 15

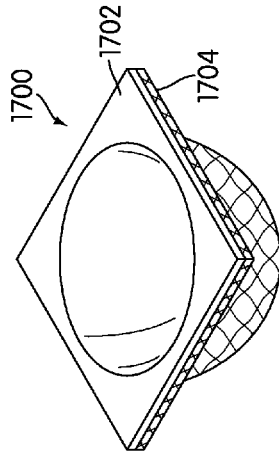


FIG. 17

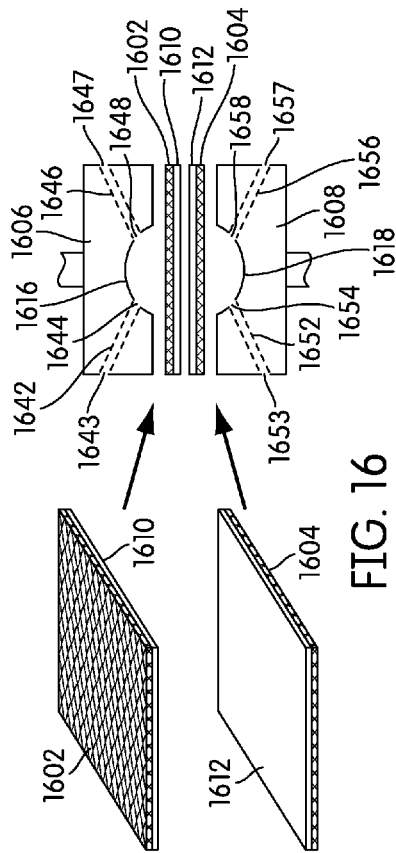


FIG. 16

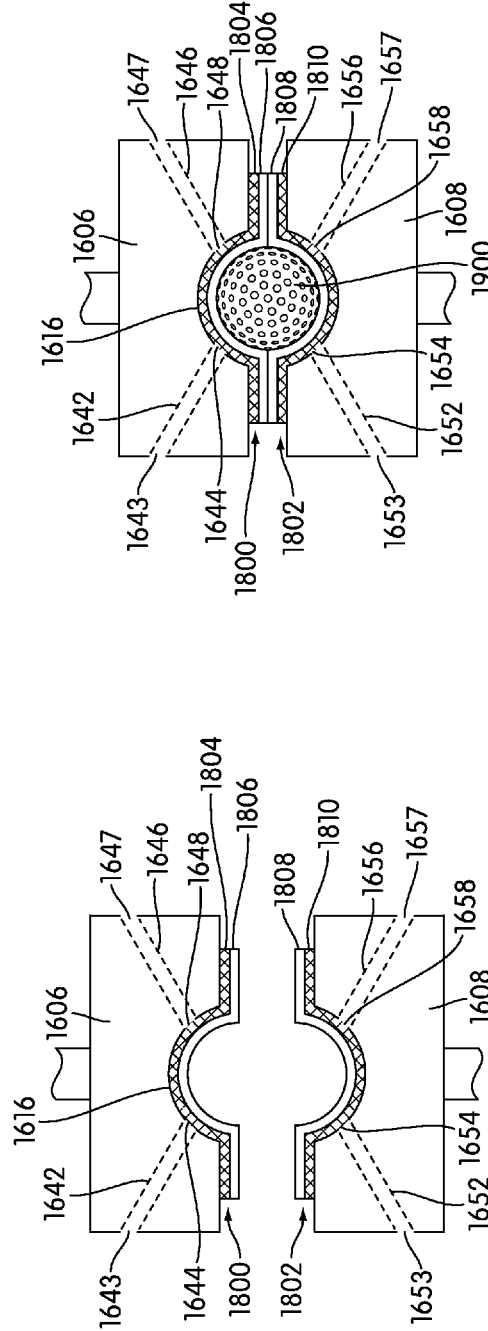


FIG. 18

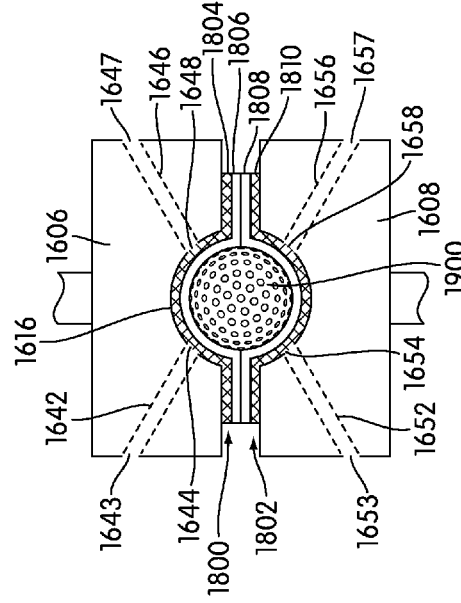


FIG. 19

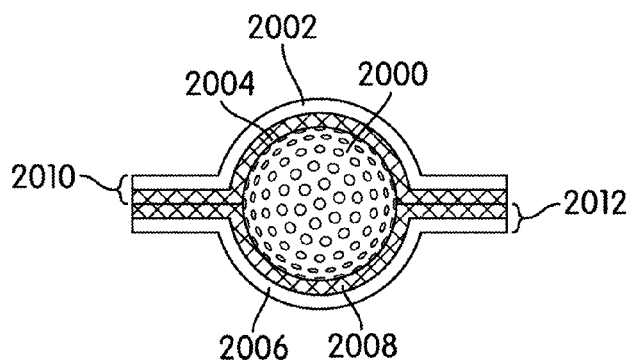


FIG. 20

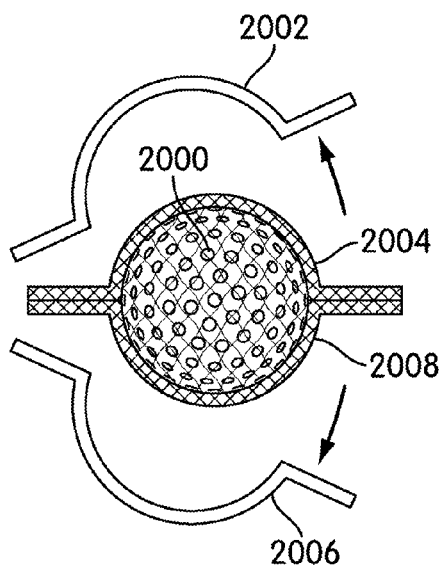


FIG. 21

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SYSTEM AND METHOD FOR MAKING A GOLF BALL WITH ONE OR MORE PATTERNED FILM LAYERS

BACKGROUND

The present invention relates generally to a system and method for manufacturing the golf ball. In particular, the system and method relates making a golf ball with one or more patterned film layers.

The game of golf is an increasingly popular sport at both the amateur and professional levels. A wide range of technologies related to the manufacture and design of golf balls are known in the art. Such technologies have resulted in golf balls with a variety of play characteristics. For example, different golf balls are manufactured and marketed to players having different golfing abilities, such as different swing speeds.

Similarly, a golfer may use different golf balls having different play characteristics depending on the golfer's preferences. For example, different dimple patterns may affect the aerodynamic properties of the golf ball during flight, or a difference in the hardness of the cover layer may affect the rate of backspin. With regard to hardness in particular, a golfer may choose to use a golf ball having a cover layer and/or a core that is harder or softer. A golf ball with a harder cover layer will generally achieve reduced driver spin, and achieve greater distances. However, a harder cover layer will generally cause a lower rate of spin, such that the golf ball will be better for drives but more difficult to control on shorter shots. On the other hand, a golf ball with a softer cover will generally experience more spin and therefore be easier to control and stop on the green, but will lack distance off the tee.

A wide range of golf balls having a variety of hardness characteristics are known in the art. Generally, the hardness of a golf ball is determined by the chemical composition and physical arrangement of the various layers making up the golf ball. Accordingly, a number of different golf ball materials are mixed and matched in various combinations and arrangements to create golf balls having different hardness values and different hardness profiles.

However, designing golf balls to achieve desired hardness characteristics suffers from at least several difficulties. Generally, the construction of known golf balls requires that a wide range of design variables such as layer arrangement, materials used in each layer, and layer thickness be balanced against each other. Changes to any of these variables may therefore improve a desired hardness only at the expense of other play characteristics. Additionally, materials costs and design costs associated with known golf ball constructions may unduly increase the cost of the golf ball to the end consumer. Perhaps most importantly, known golf balls generally cannot simultaneously achieve the advantageous play characteristics associated with high cover hardness (greater distances) while also achieving the advantageous play characteristics associated with low cover hardness (greater spin).

Therefore, there is a need in the art for a system and method that addresses the shortcomings of the prior art discussed above.

SUMMARY

A system and method for manufacturing a golf ball with one or more patterned film layers is disclosed. The system and method may involve creating a patterned film layer and applying the patterned film layer to the surface of a golf ball.

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The patterned film layer may include a layer of film having cutouts leaving the remaining portions of film. The pattern may include a net pattern. The patterned film layer may include a material that is relatively harder or relatively softer than the surface of the golf ball. The method may include removing portions of film from a film material to create a patterned film material, cutting the patterned film material into sheets, molding two patterned film sheets into substantially hemispherical cups, and applying the two substantially hemispherical cups to a golf ball.

In one aspect, the present disclosure provides a method of manufacturing a golf ball with a patterned layer. The method may include forming a pattern on a film material by removing portions of film from the film material in a pattern, molding the film material into substantially hemispherical cups, and applying the substantially hemispherical cups to the outer surface of a golf ball. The portions of film may be removed with a die cutter. The film material may be fed through a rotary die cutter. Sheets may be cut from the film material. The sheets of film material may be positioned between mold halves. A bladder may be positioned between the sheets of film material while the sheets of film material are positioned between the mold halves. The film material may be molded into substantially hemispherical cups by pressing the mold halves together and inflating the bladder between the sheets of film material so that the bladder presses the sheets against mold portions of the mold halves. The substantially hemispherical cups may be applied to the outer surface of a golf ball by positioning the substantially hemispherical cups into mold halves and pressing a golf ball between the mold halves.

In one aspect, the present disclosure provides a method of manufacturing a golf ball with a patterned layer. The method may include forming a pattern on a film material by removing portions of film from the film material in a pattern. The film material may be molded into substantially hemispherical cups by placing film material between a first set of mold halves. The substantially hemispherical cups may be applied to the outer surface of a golf ball. The first set of mold halves may be heated. Adhesive may be disposed between the substantially hemispherical cups and the outer surface of the golf ball. The substantially hemispherical cups may be applied to the outer surface of the golf ball by positioning the substantially hemispherical cups into a second set of mold halves, positioning the golf ball between the substantially hemispherical cups, and pressing the second set of mold halves together. The second set of mold halves may be heated. The film material may be unrolled from a roll of film material. Sheets of film material may be cut.

In one aspect, the present disclosure provides a method of manufacturing a golf ball with a patterned layer. The method includes forming a pattern on a film material by removing portions of film from the film material in a pattern, molding the film material into substantially hemispherical cups by placing film material between a first set of mold halves, pressing the first set of mold halves together, and inflating a bladder between the first set of mold halves, and applying the substantially hemispherical cups to the outer surface of a golf ball. Portions of film may be removed with a die cutter. The film material may be fed through a rotary die cutter. The substantially hemispherical cups may be applied to the outer surface of the golf ball by positioning the substantially hemispherical cups into a second set of mold halves, positioning the golf ball between the substantially hemispherical cups, and pressing the second set of mold

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halves together. The first set of mold halves and the second set of mold halves may include substantially hemispherical shapes.

In one aspect, the present disclosure provides a golf ball having a core, a cover layer, and a patterned film layer. The cover layer may substantially surround the core and may include a plurality of dimples and at least one land area separating the dimples. The patterned film layer may substantially surround the cover layer. The cover layer may have a first hardness and the patterned film layer may have a second hardness different from the first hardness. The first hardness may be harder than the second hardness. The first hardness may be softer than the second hardness. The patterned film layer may cover substantially all of the plurality of dimples. The patterned film layer may cover substantially all of the land area. The patterned film layer may include a net pattern defined by cutout portions. A solid film layer may substantially surround the patterned film layer.

Other systems, methods, features and advantages of the invention will be, or will become, apparent to one of ordinary skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description and this summary, be within the scope of the invention, and be protected by the following claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention can be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like reference numerals designate corresponding parts throughout the different views.

FIG. 1 is an exemplary embodiment of a golf ball having a patterned layer;

FIG. 2 illustrates a method of creating patterned sheets of film material, according to an exemplary embodiment;

FIG. 3 illustrates patterned sheets being positioned between mold halves, according to an exemplary embodiment;

FIG. 4 illustrates a deflated bladder being positioned between the patterned sheets and mold halves of FIG. 3, according to an exemplary embodiment;

FIG. 5 illustrates the mold halves of FIG. 4 being pressed together, according to an exemplary embodiment;

FIG. 6 is a perspective view of the mold halves of FIG. 4 being pressed together, according to an exemplary embodiment;

FIG. 7 illustrates the bladder of FIGS. 3-5 being inflated;

FIG. 8 is a hemispherical cup molded by the exemplary method shown in FIGS. 3-7;

FIG. 9 shows the hemispherical cup of FIG. 8 being sprayed with adhesive, according to an exemplary embodiment;

FIG. 10 illustrates hemispherical cups being placed in mold halves, according to an exemplary embodiment;

FIG. 11 illustrates the mold halves of FIG. 10 being pressed together, according to an exemplary embodiment;

FIG. 12 shows a golf ball after hemispherical cups have been applied to the outer surface of the golf ball by the exemplary method illustrated in FIGS. 10-11 to form a patterned layer;

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FIG. 13 illustrates the golf ball of FIG. 12 being placed between mold halves having a blade for trimming the ball flange, according to an exemplary embodiment;

FIG. 14 illustrates the ball flange being cut by the mold halves of FIG. 13, according to an exemplary embodiment;

FIG. 15 illustrates the golf ball of FIG. 14 undergoing finishing work;

FIG. 16 shows patterned sheets affixed with solid film sheets being positioned between mold halves according to an exemplary embodiment;

FIG. 17 shows a hemispherical cup molded according to the exemplary embodiment of FIGS. 16-19;

FIG. 18 shows hemispherical cups of FIG. 17 in first and second mold halves;

FIG. 19 shows the mold halves of FIG. 18 being pressed together;

FIG. 20 shows a golf ball covered by hemispherical cups in which patterned sheets form an inner side and solid sheet form an outer side according to an exemplary embodiment; and

FIG. 21 shows the solid sheets of FIG. 20 being peeled away.

DETAILED DESCRIPTION

A system and method for manufacturing a golf ball with one or more patterned film layers is disclosed. The system and method may involve creating a patterned film layer and applying the patterned film layer to the surface of a golf ball. The patterned film layer may include a layer of film having cutouts leaving the remaining portions of film in a pattern. For example, the pattern may include a net pattern or a pattern of holes corresponding to the dimples of a golf ball. The patterned film layer may include a material that has a different hardness from the golf ball cover material, i.e., is relatively harder or relatively softer than the cover material of the golf ball. Thus, applying the patterned film layer to the surface of a golf ball may result in the surface of the golf ball being relatively harder or softer wherever the patterned film layer is disposed. Consequently, the golf ball may have areas that are relatively harder and areas that are relatively softer. In other words, the patterned film layer may create a pattern of relative hardness on the surface of the golf ball. This patterned hardness may enhance the properties of the golf ball. For example, the patterned hardness may add strength to the golf ball or improve spinnability.

FIG. 1 shows a golf ball manufactured by an exemplary embodiment of the method. Golf ball 100 is made up of a cover layer having thereon a plurality of dimples 102 and at least one land area 104. Golf ball 100 may generally be any type of golf ball having a core and a cover layer substantially surrounding the core. For example, golf ball 100 may be of a two-piece construction, having only a core and a cover layer, or golf ball 100 may have one or more intermediate layers located between the core and the cover layer. Except as otherwise herein discussed, each layer of golf ball 100 may be formed of any material or construction as is generally known in the art of golf ball manufacturing. For example, various layers of golf ball 100 may be comprised of rubber, rubber composites, thermoplastic polyurethane, highly-neutralized polymers, ionomers, and other polymer materials known in the art of golf ball manufacturing.

Dimples 102 may generally be arranged on the cover layer in any pattern, as may be known in the art of golf balls. Various known dimple packing patterns are known in the art. Dimples 102 may generally be of any shape, such as circular, triangular, or multi-sided. Dimples 102 may be of uniform

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shape and size, or the dimple pattern may be made up of two or more different types of dimples having (for example) different sizes or different shapes. At least one land area **104** is a part of the cover layer that separates at least two dimples **102** and that is not indented or otherwise part of a dimple. Generally, land area **104** is the “ridge” or “fret” between adjoining dimples **102**. Golf ball **100** may include one continuous land area **104** across the entire cover layer, as is shown in FIG. 1, or a plurality of separate land areas between dimples **102**.

Golf ball **100** may include a patterned film layer **106**. The pattern may include any known pattern. For example, as shown in FIG. 1, the pattern may include a net pattern. In some embodiments, the pattern may be selected based on a variety of factors. For example, the pattern may be selected based on desired play characteristics of the golf ball, such as improving spin by softening the frets while leaving the aerodynamics of the dimples unaffected.

The method of manufacturing a golf ball with a patterned film layer may generally include: removing portions of film from a film material to create a patterned film material; cutting the patterned film material into sheets; molding the two patterned film sheets into hemispherical cups; and applying the two hemispherical cups to a golf ball. The method of manufacturing a golf ball may further include the methods disclosed in U.S. Patent Application No. 61/578,347 (Biaxial Film, filed Dec 21, 2011, the entirety of which is hereby incorporated by reference.

In some embodiments, patterned film layer **106** may be made from a layer of film initially having no pattern. For example, as shown in FIG. 2, a roll **200** of film material **212** may be provided. In some embodiments, film material **212** may include a polymeric material. For example, film material **212** may include thermoplastic material. In some embodiments, the thickness of the film material **212** may vary. In some embodiments, film material **212** may be within a range of $\frac{3}{1000}$ inches to $\frac{29}{1000}$ inches. In some embodiments, film material **212** may be within a range of $\frac{5}{1000}$ inches to $\frac{36}{1000}$ inches. In some embodiments, film material **212** may be within a range of $\frac{19}{1000}$ inches to $\frac{49}{1000}$ inches. In some embodiments, film material **212** may be treated prior to the pattern being formed. For example, film material **212** may be treated with chemicals, heated, or stretched. In some embodiments, film material **212** may be provided in sheets instead of a roll.

The pattern may be made by removing portions of film from film material **212**. In some embodiments, the portions of film may be removed by laser cutting processes. In some embodiments, the portions of film may be removed by die cutting processes. For example, the method may include flatbed die cutting. As shown in FIG. 2, the method may include rotary die cutting. The system may include provisions for removing portions of film from film material **212**. For example, to accomplish rotary die cutting, the system may include a die cut cylinder **202** and an anvil roller **204**. Die cut cylinder **202** may include die portions **206** corresponding to the pattern being cut into film material **212**. Die portions **206** may be configured to cut out portions of film material **212** in a pattern. FIG. 2 illustrates an embodiment in which die portions **206** may be configured to cut out portions of film material **212** in a net pattern. Anvil roller **204** may be disposed so that it engages with die portions **206** during the cutting process. For example, as shown in FIG. 2, anvil roller **204** may be disposed opposite die cut cylinder **202**.

The pattern created on film material **212** may include any suitable pattern. Thus, in some embodiments, die portions

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206 may be configured to cut out portions of film material **212** in patterns other than net patterns. For example, die portions **206** may be configured to cut out circular holes corresponding to the dimples of a golf ball. Consequently, after applying such a patterned sheet to a golf ball, the cutout portions of the patterned film may be aligned with the dimples.

The golf ball applied with this patterned film may include a film material applied only to the land areas, leaving the dimples of the golf ball exposed by cutouts provided in the patterned film. The pattern created on film material **212** and/or the orientation of the pattern may be selected according to a variety of factors. For example, the pattern and/or orientation may be selected based upon the angle of the club face and/or the impact force of the club to be used with the ball including the patterned film layer. In some embodiments, the pattern may be selected based upon how the pattern compensates for the distortion caused by the process of shaping the film material into hemispherical cups. For example, the selected pattern may be smaller in regions that will be stretched during the shaping the film material into hemispherical cups. Known processes may be used to adjust a pattern to distort so that the pattern appears properly once it is stretched. For example, a pattern may be adjusted according to the methods disclosed in U.S. Pat. No. 5,165,965 to Martin (“Martin”), entitled “Method for Providing Predistorted Images on Shrinkable Film,” issued on Nov. 24, 1992, the entirety of which is hereby incorporated by reference. This patent discloses a method of making dimensions of an image bigger before shrink wrapping the image onto a bottle. The larger dimensions compensate for the portions of the pattern that shrink during the shrink wrapping process. Similar to making dimensions of a pattern larger to compensate for shrinking, dimensions of the pattern may be made smaller to compensate for stretching.

In some embodiments, the method of cutting the pattern into film material **212** may include unrolling film material **212** from roll **200**. In some embodiments, the system may include provisions for unrolling the film material **212** from roll **200**. For example, the system may include a conveyor belt or a robotic arm to unroll film material **212** from roll **200**. In some embodiments, a human may manually unroll film material **212** from roll **200**. In some embodiments, the method may include feeding film material **212** between die cut cylinder **202** and anvil roller **204**. In some embodiments, the system may include provisions for feeding film material **212** between die cut cylinder **202** and anvil roller **204**. For example, the system may include a conveyor belt or a robotic arm for feeding film material **212** between die cut cylinder **202** and anvil roller **204**. In some embodiments, a human may manually feed film material **212** between die cut cylinder **202** and anvil roller **204**. In some embodiments, the method may include unrolling film material **212** from roll **200** as film material **212** is being fed between die cut cylinder **202** and anvil roller **204**. When film material **212** is fed between die cut cylinder **202** and anvil roller **204**, film material **212** may be pressed between die cut cylinder **202** and anvil roller **204** so that die portions **206** may cut out portions of film material **212**, creating patterned film material **214**. As film material **212** is fed between die cut cylinder **202** and anvil roller **204**, die cut cylinder **202** and anvil roller **204** may rotate at the same rate film material **212** is being fed. As a result, die portions **206** may cut a continuous pattern into film material **212**. In some embodiments, die cut cylinder **202** and anvil roller **204** may feed through film material **212** with their rotational motion.

In some embodiments, the method may include cutting patterned film material **214** into patterned sheets **216**. Accordingly, in some embodiments, the system may include provisions for cutting patterned film material **214** into patterned sheets **216**. For example, the system may include a first blade **208** and a second blade **210** opposite first blade **208**. In some embodiments, first blade **208** may be moved toward second blade **210** to cut patterned film material **214** with a shearing action. In some embodiments, second blade **210** may be moved toward first blade **208** to cut patterned film material **214** with a shearing action. In some embodiments, first blade **208** and second blade **210** may be moved toward each other to cut patterned film material **214** with a shearing action. In some embodiments, other types of cutting devices and cutting methods may be used to cut patterned film material **214** into patterned sheets **216**. For example, a second die cut roller and a second anvil may be used to cut patterned film material **214** into patterned sheets **216**. In some embodiments, film material **212** may be cut prior to creating the pattern.

In some embodiments, patterned film material **214** may be stretched prior to application to a golf ball. For example, patterned film material **214** may be stretched according to the methods disclosed in U.S. Patent Application No. 61/578,347 (Biaxial Film), filed Dec. 21, 2011, the entirety of which is hereby incorporated by reference. In embodiments in which patterned film material **214** is stretched, the pattern on patterned film material **214** may be distorted by the stretching process. For example, the initial pattern may be cut into film material **212** may be distorted into a new pattern after patterned film material **214** is stretched. In some embodiments, the initial pattern cut into the film material may be selected to result in a new pattern after the patterned film material has been stretched. In some embodiments, the method of stretching the film material may be selected to manipulate the pattern cut into the film material to arrive at a new pattern after the patterned film material has been stretched.

FIGS. 3-8 disclose a method of making patterned sheets into hemispherical cups, according to an exemplary embodiment. As is known in the art, it is virtually impossible to produce a perfectly hemispherical cup. Accordingly, it is understood that a hemispherical cup may include a cup being shaped hemispherically to standard manufacturing tolerances.

Referring back to FIGS. 3-8, the system may include a first mold half **306** and a second mold half **308**. First mold half **306** may include a first mold portion **316** corresponding to the hemispherical shape of half of a golf ball. In some embodiments, first mold portion **316** may include protrusions corresponding to the dimples of a golf ball. Second mold half **308** may include a second mold portion **318** corresponding to the hemispherical shape of half of a golf ball. In some embodiments, second mold portion **318** may include protrusions corresponding to the dimples of a golf ball. FIG. 3 illustrates how a first patterned sheet **302** and a second patterned sheet **304** may be positioned between first mold half **306** and second mold half **308**. In some embodiments, first patterned sheet **302** may be particularly oriented with respect to first mold portion **316** and second patterned sheet **304** may be particularly oriented with respect to second mold portion **318**. The orientation of the patterned sheets may be determined based on a variety of factors. For example, the orientation may be based on the pattern of the patterned sheets and how the pattern will be lined up with the dimples of the golf ball after application to the golf ball. In some embodiments, the system may include provisions

for automatically orienting the patterned sheets. For example, a laser sensor or a visual sensor may be used to align the patterned sheets within first mold half **306** and second mold half. In another example, a human may visually inspect and orient the patterned sheets.

In some embodiments, additional patterned sheets may be positioned between first mold half **306** and second mold half **308** to simultaneously mold multiple patterned layers. For example, four patterned sheets may be positioned between first mold half **306** and second mold half **308**. In another example, ten patterned sheets may be positioned between first mold half **306** and second mold half **308**. In some embodiments, release film may be provided between the patterned sheets to prevent the patterned sheets from sticking to one another. In some embodiments, the additional patterned sheets may include the same or different patterns as first patterned sheet **302** and second patterned sheet **304**. In some embodiments, the additional patterned sheets may include the same or different materials as first patterned sheet **302** and second patterned sheet **304**. In some embodiments, first mold half **306** and second mold half **308** may include multiple mold portions to mold multiple hemispherical cup shapes simultaneously. Such a formation may allow multiple golf balls to be coated simultaneously. As discussed in further detail below with respect to FIGS. 16-21, plain sheets without patterns may be molded with patterned sheets.

FIG. 4 illustrates a deflated bladder **410** being placed between first sheet **302** and second sheet **304**. Bladder **410** may be placed between first sheet **302** and second sheet **304** while the sheets are positioned between first mold half **306** and second mold half **308**. Bladder **410** may be made of any material suitable for being inflated. For example, bladder **410** may be made of mylar, latex, or rubber. Bladder **410** may be in fluid communication with an incompressible fluid supply **412**. For example, as shown in FIG. 4, a tube **314** may connect the incompressible fluid supply **412** to bladder **410**. The incompressible fluid may include a liquid or gas suitable for inflating bladder **410**. For example, the incompressible fluid may include water, argon, or nitrogen.

FIG. 5 illustrates first mold half **306** and second mold half **308** being pressed together against first patterned sheet **302** and second patterned sheet **304**, according to an exemplary embodiment. In some embodiments, first mold half **306** may be moved toward second mold half **308** to press the two mold halves together. In some embodiments, second mold half **308** may be moved toward first mold half **306** to press the two mold halves together. In some embodiments, first mold half **306** and second mold half **308** may be moved toward each other to press the two mold halves together. Pressing first mold half **306** and second mold half **308** together may result in bladder **410** being surrounded by the patterned sheets. While first mold half **306** and second mold half **308** are pressed together, first mold portion **316** and second mold portion **318** may together form a shape that is substantially similar to the shape of a golf ball.

FIG. 6 is a perspective view of first mold half **306** and second mold half **308** pressed together. First mold half **306** may include a first notch **620** and second mold half **308** may include a second notch **622**. First notch **620** and second notch **622** may together create a tunnel when first mold half **306** and second mold half **308** are pressed together. The tunnel may be configured to receive tube **314**. The tunnel may prevent tube **314** from being compressed, thus preserving fluid communication between incompressible fluid supply **412** and bladder **410**. In some embodiments, tube **314** may have an outer diameter in the range of 250 microns to

6 mm. The diameter of the tunnel may correspond with the diameter of tube **314**. Minimizing the size of tube **314** may minimize the interruption of contact between first mold half **306** and second mold half **308**. Consequently, the shape of the hemispherical cups may be negligibly affected by tube **314**. In some embodiments, to prevent the tube from interfering with patterned sheet, the tube may be aligned with a hole in the pattern.

FIG. 7 shows how bladder **410** may be inflated with incompressible fluid after first mold half **306** and second mold half **308** are pressed together. In some embodiments, bladder **410** may be inflated before first mold half **306** and second mold half **308** are pressed together. In some embodiments, bladder **410** may be inflated as first mold half **306** and second mold half **308** are being pressed together. Bladder **410** may be inflated until it presses first patterned sheet **302** against first mold portion **316** and second patterned sheet **304** against second mold portion **318**. Once fully inflated, bladder **410** may have a size and shape substantially similar to the size and shape of a golf ball. As a result, bladder **410** may press and mold first patterned sheet **302** and second patterned sheet **304** into hemispherical cups having a size and shape substantially similar to the size and shape of a golf ball.

In some embodiments, heat may be applied to first patterned sheet **302** and second patterned sheet **304** before, during, or after inflation of bladder **410**. In some embodiments, heat may be applied to first mold portion **316** and/or second mold portion **318** before, during, or after inflation of bladder **410**. In some embodiments, the system may include provisions for heating the patterned sheets and/or the mold halves. For example, the system may include heating coils or other known heating devices within first mold half **306** and second mold half **308**. In some embodiments, first mold half **306** and second mold half **308** may be pressed together in a heated environment. Applying heat may enhance molding of first patterned sheet **302** and second patterned sheet **304**. The temperature of the heat applied may be sufficiently high to make the patterned sheets relatively malleable without losing the shape of the pattern or melting entirely. For example, in some embodiments, the heat may be within a range of 300° F. to 400° F. In some embodiments, the heat may be within a range of 400° F. to 500° F. The temperature of the heat applied may depend upon the type of materials used.

In some embodiments, as discussed below with respect to the embodiments shown in FIGS. 16-18, air may be suctioned out of the space disposed between first mold portion **316** and first patterned sheet **302** and the space disposed between second mold portion **318** and second patterned sheet **304** while bladder **410** is inflated. Removing air from the spaces disposed between the mold portions and the patterned sheets may prevent air from being trapped in these spaces. Removing trapped air may enhance the molding process because trapped air may interfere with the molding process. In some embodiments, the patterned sheets may be individually formed into hemispherical cup shapes by first mold half **306** and another mold half having a convex shape corresponding to first mold half **306**. In such an embodiment, in place of inflating bladder **410**, the convex mold shape may be used to press the patterned sheet into first mold half **306** to mold the patterned sheet into a hemispherical cup.

FIG. 8 shows a hemispherical cup **800** molded by the exemplary method described with reference to FIGS. 3-7. Hemispherical cup **800** may have an inner surface **806** and an outer surface **808**. Inner surface **806** may be applied to the surface of a golf ball. Hemispherical cup **800** may have a

hemispherical cup-shaped portion **802** and a flange **804** extending radially from hemispherical cup-shaped portion **802**. In some embodiments, flange **804** may be cut immediately after a patterned sheet has been molded into a hemispherical cup.

After the patterned sheets are molded into hemispherical cups, the hemispherical cups may be applied to a golf ball. Adhesive may be disposed between hemispherical cup **800** and a golf ball to attach hemispherical cup **800** to the golf ball. FIG. 9 illustrates how the adhesive may be applied to inner surface **806**. In some embodiments, the adhesive may be applied to hemispherical cup **800** before applying hemispherical cup **800** to the surface of a golf ball. In some embodiments, the adhesive may be applied to outer surface **808** instead of or in addition to inner surface **806**. Applying the adhesive to outer surface **808** may facilitate adhering multiple hemispherical cups together when creating a golf ball with multiple patterned layers. Applying the adhesive to outer surface **808** may prevent delamination between patterned layers in golf balls having multiple patterned layers. In some embodiments, the adhesive may be applied to the golf ball instead of or in addition to surface **806**. The adhesive may be applied by any known method and the system may include provisions for applying the adhesive to the molded sheets. For example, as shown in FIG. 9, a spray gun **902** may spray the adhesive onto hemispherical cup **800**. The adhesive may include any known adhesive. For example, the adhesive may include ethylene vinyl acetate. In another example, the adhesive may include a heat-activated adhesive. In some embodiments, the adhesive may include an adhesive film material that is disposed between the surfaces to be bonded.

FIGS. 10-11 illustrate a first hemispherical cup **1002** and a second hemispherical cup **1004** being applied to the outer coating a golf ball **1006**. In some embodiments, as shown in FIG. 10, first hemispherical cup **1002** may be placed in a third mold half **1008** and second hemispherical cup **1004** may be placed in a fourth mold half **1010**. Third mold half **1008** may include a third mold portion **1014** corresponding to the hemispherical shape of half of a golf ball. In some embodiments, third mold portion **1014** may include protrusions corresponding to the dimples of a golf ball. Fourth mold half **1010** may include a fourth mold portion **1016** corresponding to the hemispherical shape of half of a golf ball. In some embodiments, fourth mold portion **1016** may include protrusions corresponding to the dimples of a golf ball. In some embodiments, first hemispherical cup **1002** and second hemispherical cup **1004** may remain in the mold halves they were molded in. In some embodiments, after adhesive is applied to first hemispherical cup **1002** and second hemispherical cup **1004** and/or the flange is cut from first hemispherical cup **1002** and second hemispherical cup **1004**, first hemispherical cup **1002** and second hemispherical cup **1004** may be placed in either new mold halves or the same mold halves they were molded. In some embodiments, third mold half **1008** and fourth mold half **1010** may include multiple mold portions to apply multiple hemispherical cups to multiple golf balls simultaneously. Such a formation may allow multiple golf balls to be coated simultaneously.

In some embodiments, first hemispherical cup **1002** may be particularly oriented with respect to third mold portion **1014** and second hemispherical cup **1004** may be particularly oriented with respect to fourth mold portion **1016**. The orientation of first hemispherical cup **1002** and second hemispherical cup **1004** may be determined based on a variety of factors. For example, the orientation may be based on the pattern of first hemispherical cup **1002** and second

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hemispherical cup **1004** and how it will be lined up with the dimples **1012** golf ball **1006**. In some embodiments, the system may include provisions for automatically orienting first hemispherical cup **1002** and second hemispherical cup **1004**. For example, a laser sensor or a visual sensor may be used to align first hemispherical cup **1002** within third mold half **1008** and second hemispherical cup **1004** within fourth mold half **1010**. In another example, a human may visually inspect and orient first hemispherical cup **1002** and second hemispherical cup **1004**. In yet another example, the mold halves may be mechanically keyed to orient the hemispherical cups.

In some embodiments, golf ball **1006** may be particularly oriented with respect to third mold portion **1014** and/or fourth mold portion **1016**. In some embodiments, golf ball **1006** may be particularly oriented with respect to first hemispherical cup **1002** and/or second hemispherical cup **1004**. The orientation of golf ball **1006** may be determined based on a variety of factors. For example, the orientation may be based on the pattern of first hemispherical cup **1002** and second hemispherical cup **1004** and how it will be lined up with dimples **1012**. In some embodiments, the system may include provisions for automatically placing golf ball **1006** into one or both of third mold half **1008** and second mold half **1010** with the correct orientation. For example, a laser sensor or a visual sensor may be used to align golf ball **1006** with one or both of third mold half **1008** and fourth mold half **1010** with the correct orientation. In another example, a human may visually inspect and orient golf ball **1006**.

In some embodiments, additional hemispherical cups may be positioned between golf ball **1006** and third mold portion **1014** and between golf ball **1006** and fourth mold portion **1016**. Additional hemispherical cups may be added to create a golf ball with multiple patterned layers. For example, one additional hemispherical cup may be positioned between golf ball **1006** and third mold portion **1014** and one additional hemispherical cup may be positioned between golf ball **1006** and fourth mold portion **1016** to create a golf ball with two patterned layers. In another example, five additional hemispherical cups may be positioned between golf ball **1006** and third mold portion **1014** and five additional hemispherical cups may be positioned between golf ball **1006** and fourth mold portion **1016** to create a golf ball with six patterned layers. In some embodiments, the additional hemispherical cups may include the same or different patterns as first hemispherical cup **1002** and second hemispherical cup **1004**. In some embodiments, the additional patterned sheets may include the same or different materials as first hemispherical cup **1002** and second hemispherical cup **1004**.

FIG. **11** illustrates how third mold half **1008** and fourth mold half **1010** may be pressed together to apply the hemispherical cups to golf ball **1006**. In some embodiments, third mold half **1008** may be moved toward fourth mold half **1010** to press the two mold halves together. In some embodiments, fourth mold half **1010** may be moved toward third mold half **1008** to press the two mold halves together. In some embodiments, third mold half **1008** and fourth mold half **1010** may be moved toward each other to press the two mold halves together. The compressive forces applied to the hemispherical cups and golf ball **1006** by the mold halves facilitates bonding the hemispherical cups to the outer surface of golf ball **1006**. In some embodiments, the flange **1018** of first hemispherical cup **1002** and the flange **1020** of second hemispherical cup **1004** may be fused together to form a ball flange. In some embodiments, flange **1018** and flange **1020** may be removed prior to application of the

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hemispherical cups to the outer surface of golf ball **1006**. Accordingly, a ball flange may not be formed in those embodiments.

In some embodiments, heat may be applied to first hemispherical cup **1002** and second hemispherical cup **1004** before, during, or after third mold half **1008** and fourth mold half **1010** are pressed together. In some embodiments, heat may be applied to third mold portion **1014** and/or fourth mold portion **1016** before, during, or after third mold half **1008** and fourth mold half **1010** are pressed together. The temperature of the heat may be less than the melt temperature of the cover material of golf ball **1006** to ensure that the cover material does not melt and/or become deformed. In some embodiments, applying heat may activate an adhesive disposed between first hemispherical cup **1002** and golf ball **1006** and between second hemispherical cup **1004** and golf ball **1006**. The temperature of the heat may be high enough to adhere first hemispherical cup **1002** and second hemispherical cup **1004** to golf ball **1006**. For example, in embodiments in which a heat-activated adhesive has been disposed between golf ball **1006** and hemispherical cup **1002** and between golf ball **1006** and second hemispherical cup **1004**, the temperature of the heat may be high enough to activate the adhesive. In some embodiments, applying heat may slightly melt first hemispherical cup **1002** and second hemispherical cup **1004** to facilitate bonding the hemispherical cups to golf ball **1006**. In some embodiments, the temperature of the heat may be sufficiently high to make hemispherical cup **1002** and second hemispherical cup **1004** sufficiently melted to bond to the surface of golf ball. In some embodiments, the temperature of the heat may be within a range of 300° F. to 400° F. In some embodiments, the temperature of the heat may be within a range of 400° F. to 500° F. The temperature of the heat applied may depend upon the type of materials used.

In some embodiments, the system may include provisions for heating the hemispherical cups and/or the mold portions. For example, the system may include heating coils or other known heating devices within third mold half **1008** and fourth mold half **1010**. In some embodiments, third mold half **1008** and fourth mold half **1010** may be pressed together in a heated environment.

FIG. **12** shows golf ball **1006** after first hemispherical cup **1002** and second hemispherical cup **1004** have been applied to the outer surface of golf ball **1006** by the exemplary method described with reference to FIGS. **10-11** to form a patterned layer **1202**. Golf ball **1006** may include flashing **1204** formed by flange **1018** and flange **1020** being fused together. In some embodiments, flange **1018** and flange **1020** may be removed prior to application of the hemispherical cups to the outer surface of golf ball **1006**. Accordingly, a ball flange may not be formed in those embodiments. In some embodiments, flashing **1204** may be trimmed prior to removing golf ball **1006** from third mold half **1008** and fourth mold half **1010** after first hemispherical cup **1002** and second hemispherical cup **1004** have been applied to the outer surface of golf ball **1006**. In some embodiments, the system may include provisions for trimming the flashing **1204** after first hemispherical cup **1002** and second hemispherical cup **1004** have been applied to the outer surface of golf ball **1006**. For example, as shown in FIG. **13**, a fifth mold half **1302** may include a blade **1304** disposed on a rim of a fifth mold portion **1306**. Blade **1304** may be configured to be received by a sixth mold portion **1308** of a sixth mold half **1310**. FIGS. **13-14** illustrate how blade **1304** may trim flashing **1204** from golf ball **1006** according to an exemplary embodiment. Golf ball **1006** may be placed between fifth

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mold half **1302** and sixth mold half **1308**. Golf ball **1006** may be pressed between fifth mold half **1302** and sixth mold half **1308**. Blade **1304** may cut through flashing **1204** as fifth mold half **1302** is pressed together with sixth mold half **1308**. As a result, flashing **1204** is trimmed from golf ball **1006**. In some embodiments, third mold half **1008** and fourth mold half **1010** may be configured to trim the flanges of first hemispherical cup **1002** and second hemispherical cup **1004** as first hemispherical cup **1002** and second hemispherical cup **1004** are bonded to golf ball **1006**. In some embodiments, the flanges cut from hemispherical cups or golf balls having a patterned layer may be recycled and may be used to form another roll of film material.

In some embodiments, golf ball **1006** may be ready for finishing work after patterned layer **1202** has been applied. For example, finishing work may include spraying golf ball **1006** with a coating. FIG. **15** illustrates how golf ball **1006** may be sprayed with a coating so that patterned layer **1202** and the surfaces of golf ball **1006** exposed by cutouts in patterned layer **1202** may be coated. In some embodiments, the system may include provisions for coating golf ball **1006**. For example, as shown in FIG. **15**, the system may include a spray gun **1502** for spraying golf ball **1006** with a coating material. The coating material may include paint or other materials adding to the characteristics of the golf ball. In some embodiments, golf ball **1006** may be sprayed with a protective coating or a coating that imparts aerodynamic properties to the golf ball. In some embodiments, finishing work may include marking golf ball **1006** with a logo. In some embodiments, patterned layer **1202** may include a different color than the outer coating of golf ball **1006**. In other embodiments, patterned layer **1202** may include the same color as the outer coating of golf ball **1006**. In some embodiments, patterned layer may include a pattern of colors. In some embodiments, patterned layer **1202** may include a different texture than that of the outer coating of golf ball **1006**. In some embodiments, patterned layer **1202** may include the same texture as that of the outer coating of golf ball **1006**.

In some embodiments, the molds used to apply hemispherical cups to a golf ball may include provisions for applying positive and/or negative pressure to the golf ball components during the molding process. Applying positive and/or negative pressure may prevent wrinkles or air pockets from developing between the sheets and the bladder used to make hemispherical cups. Applying positive and/or negative pressure may aid in orienting the sheets in molds. Applying positive and/or negative pressure may enhance the application process by preventing wrinkles or air pockets from developing between the hemispherical cups and the outer surface of a golf ball. To prevent air from flowing through the holes in the patterned sheets, solid film sheets may be affixed to the patterned sheets during the process of making the patterned sheets into hemispherical cups. For example, as shown in FIG. **16**, a first patterned sheet **1602** may be affixed to a first solid film sheet **1610** and a second patterned sheet **1604** may be affixed to a second solid film sheet **1612**. In some embodiments, the patterned sheets may be affixed to the solid film sheets by adhesive.

FIGS. **16-19** illustrates an exemplary embodiment in which the molds used to make patterned sheets into hemispherical cups and/or to apply hemispherical cups to a golf ball may include provisions for applying positive and/or negative pressure to the golf ball components during the molding process. This embodiment may include a first mold half **1606** and a second mold half **1608**. First mold half **1606** may include a first mold portion **1616** corresponding to the

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hemispherical shape of half of a golf ball. In some embodiments, first mold portion **1616** may include protrusions corresponding to the dimples of a golf ball. Second mold half **1608** may include a second mold portion **1618** corresponding to the hemispherical shape of half of a golf ball. In some embodiments, second mold portion **1618** may include protrusions corresponding to the dimples of a golf ball.

First mold half **1606** may include provisions for applying positive and/or negative pressure to the golf ball components during the molding process. Referring to FIG. **16**, first mold half **1606** may include a first passage **1642** and a second passage **1646** capable of providing positive pressure and/or negative pressure (e.g., a vacuum). In other embodiments, first mold half **1606** may include any number of passages. After the first mold half **1606** and second mold half **1608** are brought together, positive pressure and/or negative pressure may be provided at an outer end **1648** of first passage **1642** and at an outer end **1647** of second passage **1646**. In some embodiments, outer end **1648** of first passage **1642** may be located on an exterior surface of first mold half **1606**, while an inner end **1644** may be located on first mold portion **1616**. In some embodiments, outer end **1647** of second passage **1646** may be located on the exterior surface of first mold half **1606**, while an inner end **1648** may be located on first mold portion **1616**. Providing positive pressure and/or negative pressure at outer end **1648** of first passage **1642** and at outer end **1647** of second passage **1646** may result in a positive pressure and/or negative pressure at inner end **1644** of first passage **1642** and inner end **1648** of second passage **1646**.

In some embodiments, second mold half **1608** may include provisions to apply positive and/or negative pressure to the golf ball components during the molding process. Referring to FIG. **16**, second mold half **1608** may include a third passage **1652** and a fourth passage **1656** capable of providing positive pressure and/or vacuum pressure. In other embodiments, second mold half **1608** may include any number of passages. After first mold half **1606** and second mold half **1608** are brought together, a positive pressure and/or negative pressure may be provided at an outer end **1653** of third passage **1652** and at an outer end **1657** of fourth passage **1656**. In some embodiments, outer end **1653** of third passage **1652** may be located on an exterior surface **1638** of second mold half **1608**, while an inner end **1654** may be located on second mold portion **1618**. In some embodiments, outer end **1657** of fourth passage **1656** may be located on the exterior surface **1639** of second mold half **1608**, while an inner end **1658** may be located on second mold portion **1618**. Providing positive pressure and/or negative pressure at outer end **1653** of third passage **1652** and at outer end **1657** of fourth passage **1656** may result in a positive pressure and/or negative pressure at inner end **1654** of third passage **1652** and inner end **1658** of fourth passage **1656**.

The mold halves of the embodiment shown in FIGS. **16-19** may be used to perform the method of making hemispherical cups discussed above with reference to FIGS. **1-9**. When using the mold halves of the embodiment shown in FIGS. **16-19**, positive and/or negative pressure may be applied to the patterned sheets. For example, when the patterned sheets are formed into hemispherical cups, air may be suctioned out of the mold halves through the passages to pull the sheets into the mold portions of the mold halves as the bladder expands.

FIG. **17** illustrates a hemispherical cup **1700** formed by first mold half **1606** and second mold half **1608**. Hemispherical cup **1700** includes an inner side **1702** formed by a solid sheet and an outer side **1704** formed by a patterned

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sheet affixed to the solid sheet. In some embodiments, the solid sheet may only be used during the molding of the hemispherical cup. In such embodiments, the solid sheet may be removed before applying the patterned hemispherical cup to a golf ball. For example, as discussed below with reference to FIG. 21, the solid sheet may be peeled away from the hemispherical cup. In some embodiments, the solid sheet may be made of a material that dissolves. For instance, the solid sheet may dissolve with application of heat during the process of making hemispherical cups. In some embodiments, pressure and/or heat may transform the solid sheet into an adhesive to enhance adhesion between the hemispherical cup and the golf ball. In some embodiments, the solid sheet may include another layer of material on the finished golf ball. Thus, the solid sheet may remain as part of the hemispherical cup when the hemispherical cup is applied to a golf ball. For example, FIGS. 18-19 illustrate a first hemispherical cup 1800 and a second hemispherical cup 1802 being applied to the outer coating of a golf ball 1900. In some embodiments, the solid sheets may change the characteristics of golf ball 1900. For example, the solid sheets may form a layer improving the aerodynamics of the golf ball. In some embodiments, the solid sheets and patterned sheets may be bonded together by heat and/or pressure while the hemispherical cups are being formed. In some embodiments, as shown in FIG. 18, first hemispherical cup 1800 may remain in first mold half 1606 and second hemispherical cup 1802 may remain in second mold half 1608 after the hemispherical cups have been formed in the mold halves. In other embodiments, a different set of mold halves may be used to apply the hemispherical cups to the outer coating of a golf ball.

First mold half 1606 and second mold half 1608 or another set of mold halves may be used to apply the hemispherical cups to the outer coating of golf ball 1900 in the same manner discussed above with reference to FIGS. 10-11. For example, in some embodiments, first mold half 1606 and second mold half 1608 may be pressed together to apply the hemispherical cups to golf ball 1900, as shown in FIG. 19. In some embodiments, at any point during the application process, positive and/or negative pressure may be applied to the hemispherical cups. For example, negative pressure may be applied to the hemispherical cups when first mold half 1606 is moved toward second mold half 1608. This suction may hold first hemispherical cup 1800 in first mold half 1606 and a second hemispherical cup 1802 in second mold half 1608.

In some embodiments, instead of the solid sheet forming the inner side of the hemispherical cup, the solid sheet may form the outer side of the hemispherical sheet. For example, as shown in FIG. 20, a golf ball 2000 may be covered by a first hemispherical cup 2010 and a second hemispherical cup 2012. A solid sheet may form an outer side 2002 of first hemispherical cup 2010 and a patterned sheet may form an inner side 2004 of first hemispherical cup 2010. A solid sheet may form an outer side 2006 of second hemispherical cup 2012 and a patterned sheet may form an inner side 2008 of second hemispherical cup 2012. First hemispherical cup 2010 and second hemispherical cup 2012 may be applied to a golf ball 2000 by any of the disclosed methods. In some embodiments, the solid sheets remain on golf ball 2000 as another layer of material overlying the patterned layers. In some embodiments, as discussed above, the solid sheets may be transformed into an adhesive. In some embodiments, as discussed above, the solid sheets may be removed or dissolved. For example, as indicated by the arrows shown in FIG. 21, the solid sheets may be peeled away from the

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patterned layers after the hemispherical cups have been applied to the golf ball. In some embodiments, the solid sheets may be peeled away from the patterned layers before the hemispherical cups are applied to the golf ball.

While various embodiments of the invention have been described, the description is intended to be exemplary, rather than limiting and it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible that are within the scope of the invention. Accordingly, the invention is not to be restricted except in light of the attached claims and their equivalents. Also, various modifications and changes may be made within the scope of the attached claims.

What is claimed is:

1. A method of manufacturing a golf ball with a patterned layer, comprising:

providing a golf ball, wherein the golf ball comprises a land area and a plurality of dimples;

forming a pattern on a film material by removing portions of film from the film material;

molding the film material with the pattern into substantially hemispherical cups of the film material with the pattern; and then

applying the substantially hemispherical cups of the film material with the pattern to the land area of the golf ball to form the patterned layer, wherein the pattern on the film is aligned with the dimples of the golf ball.

2. The method according to claim 1, further comprising removing the portions of film with a die cutter.

3. The method according to claim 2, further comprising feeding the film material through a rotary die cutter.

4. The method according to claim 1, further comprising cutting sheets from the film material with the pattern.

5. The method according to claim 4, further comprising positioning the sheets of film material with the pattern between mold halves.

6. The method according to claim 5, further comprising positioning a bladder between the sheets of film material with the pattern while the sheets of film material with the pattern are positioned between the mold halves.

7. The method according to claim 6, further comprising molding the film material with the pattern into substantially hemispherical cups of the film material with the pattern by pressing the mold halves together and inflating the bladder between the sheets of film material with the pattern so that the bladder presses the sheets against mold portions of the mold halves.

8. The method according to claim 1, further comprising applying the substantially hemispherical cups of the film material with the pattern to the outer surface of a golf ball by positioning the substantially hemispherical cups of the film material with the pattern into mold halves and pressing a golf ball between the mold halves.

9. The method of claim 1, wherein the substantially hemispherical cups of the film material with the pattern form a patterned layer with a hardness different from the hardness of the outer surface of the golf ball.

10. A method of manufacturing a golf ball with a patterned layer, comprising:

providing a golf ball, wherein the golf ball comprises a land area and a plurality of dimples;

forming a pattern on a film material by removing portions of film from the film material in a pattern;

molding the film material with the pattern into substantially hemispherical cups of the film material with the pattern by placing film material with the pattern between a first set of mold halves; and then

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applying the substantially hemispherical cups of the film material with the pattern to the land area of the golf ball to form the patterned layer, wherein the pattern on the film is aligned with the dimples of the golf ball.

11. The method according to claim 10, further comprising heating the first set of mold halves. 5

12. The method according to claim 10, further comprising disposing adhesive between the substantially hemispherical cups of the film material with the pattern and the outer surface of the golf ball. 10

13. The method according to claim 10, further comprising applying the substantially hemispherical cups of the film material with the pattern to the outer surface of the golf ball by positioning the substantially hemispherical cups of the film material with the pattern into a second set of mold halves, positioning the golf ball between the substantially hemispherical cups of the film material with the pattern, and pressing the second set of mold halves together. 15

14. The method according to claim 13, further comprising heating the second set of mold halves. 20

15. The method according to claim 10, further comprising unrolling the film material from a roll of film material.

16. The method according to claim 15, further comprising cutting sheets of film material.

17. The method of claim 10, wherein the substantially hemispherical cups of the film material with the pattern form a patterned layer with a hardness different from the hardness of the outer surface of the golf ball. 25

18. A method of manufacturing a golf ball with a patterned layer, comprising: 30

providing a golf ball, wherein the golf ball comprises a land area and a plurality of dimples;

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forming a pattern on a film material by removing portions of film from the film material in a pattern;

molding the film material with the pattern into substantially hemispherical cups of the film material with the pattern by placing film material with the pattern between a first set of mold halves, pressing the first set of mold halves together, and inflating a bladder between the first set of mold halves; and then

applying the substantially hemispherical cups of the film material with the pattern to the land area of the golf ball, wherein the pattern on the film is aligned with the dimples of the golf ball.

19. The method according to claim 18, further comprising removing the portions of film with a die cutter.

20. The method according to claim 19, further comprising feeding the film material through a rotary die cutter.

21. The method according to claim 18, further comprising applying the substantially hemispherical cups of the film material with the pattern to the outer surface of the golf ball by positioning the substantially hemispherical cups of the film material with the pattern into a second set of mold halves, positioning the golf ball between the substantially hemispherical cups of the film material with the pattern, and pressing the second set of mold halves together.

22. The method according to claim 21, wherein the first set of mold halves and the second set of mold halves include substantially hemispherical shapes.

23. The method of claim 18, wherein the substantially hemispherical cups of the film material with the pattern form a patterned layer with a hardness different from the hardness of the outer surface of the golf ball.

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